

compact multi dimensional translation stages

TRITOR 50 CAP

- highly compact design with integrated feedback sensor
- accurate parallel motion by parallelogram design
- high reliability and linearity due to solid state hinges
- motion without mechanical play
- high resolution in nm and sub-nm range
- motion up to 50 µm
- precision pin holes

applications:

- optics, laser tuning, fiber positioning
- micromanipulation, biology
- scanning systems



fig.: TRITOR 50 CAP

Concept

piezosystem jena was the first to introduce the compact XYZ nanopositioning stage TRITOR, and we can now stand behind this system as the only company to have over 10 years experience of designing and manufacturing such three axes stages.

The TRITOR 50 CAP combines the advantages of a very compact size with the positioning accuracy of a capacitive regulated system. The system offers motion of 50 µm in all three axes.

TRITOR elements can be easily combined with other mechanical positioning systems.

Specials

Outstanding feature of the TRITOR 50 CAP is its compact design. It has very small dimensions and an integrated capacitive feedback system. Due to FEA-optimization of these stages you meet highest dynamical performance and excellent guiding accuracy. The TRITOR 50 CAP features very high positioning accuracy and repeatability.

Parallel motion is achieved without play because of the mechanical design.

Due to the integrated feedback sensors the effects of drift and hysteresis are eliminated.

Piezoactuators can also function in cryogenic environments. The only specification that is affected is an decrease in total motion.

Mounting/Installation:

TRITOR elements consist of actuators integrated in a housing with an internal lever transmission. Since the lever mechanism works in both directions, forces between housing and top plate need to be avoided, as they could damage the stage.

The stage is attached by using two diagonal holes. Components can be mounted on the top plate by two diagonal tapped holes and can be accurately located by using the precision pin holes.

Technical Data:

series TRITOR		unit	TRITOR 50 CAP	
part no.		-	T-402-06D	
axes		-	x, y, z	
motion open loop ($\pm 10\%$)*	x/y/z	μm	50	
motion closed loop ($\pm 0,2\%$)*	x/y/z	μm	40	
capacitance ($\pm 20\%$)**	x/y/z	μF	1	
feedback sensor		-	capacitive	
resolution open loop***	x/y/z	nm	0.1	
resolution closed loop ***	x/y/z	nm	1	
typ. repeatability		nm	4	
typ. non-linearity		%	0.008	
resonant frequency	x/y/z	Hz	347 / 368 / 404	
additional load = 15g	x/y/z	Hz	315 / 325 / 370	
additional load = 50g	x/y/z	Hz	230 / 240 / 345	
additional load = 100g	x/y/z	Hz	160 / 160 / 295	
additional load = 300g	x/y/z	Hz	85 / 85 / 150	
stiffness	x/y/z	N/ μm	0.27 / 0.32 / 0.58	
max. push/pull force open loop	x/y/z	N	13.5 / 13.5 / 13.5	
max. push/pull force closed loop****	x/y/z	N	1.35 / 1.6 / 2.9	
max. load		N	13.5	
lateral force limit		N	13.5	
rotational error	roll	x/y/z	μrad	3 / 23 / 7
	pitch	x/y/z	μrad	3 / 5 / 2
	yaw	x/y/z	μrad	4 / 4 / 20
dimensions (l x w x h)		mm^3	55 x 42 x 35	
voltage range		V	-20 ... +130	
connector	voltage	-	D-sub 15pin	
	sensor	-	D-sub 15pin	
cable length		m	2	
min. bend radius of cable		m	>15	
temperature range		$^{\circ}\text{C}$	-20 ... +80	
material		-	stainless steel / aluminum	
weight		g	215	

* typical value measured with d-drive controller

** typical value for small electrical field strength

*** The resolution is only limited by the noise of the power amplifier and metrology.

****max. force at which the system operates in closed loop mode within the specification

recommended configuration:

actuator	TRITOR 50 CAP	T-402-06D
amplifier/controller	3x EVD 50 CL	E-720-300
casing for d-Drive		E-751-000

Please pay attention to our “notes for mounting”, which are available as download on our homepage.

instructions for using piezoelectrical elements and power supplies

- Piezoelectric actuators from **piezosystem jena** are controlled by voltages up to 150V. These values can be quite hazardous. Therefore read the installation instructions carefully and only authorized personal should handle the power supply.
- After transportation, piezoelectric actuators should be allowed to adapt for approximately 2 hours to the room temperature before being switched on.
- Piezoelectric actuators are made from ceramic materials with and without metallic casings. The piezo-ceramic is a relatively brittle material. This should be noted when handling piezoelectrical actuators. All piezo-elements are sensitive to bending or shock forces.
- Due to the piezoelectric effect piezo-actuators can generate electrical charges by changing the mechanical load or the temperature or such actions described above.
- Piezoelectric actuators are able to work under high compressive forces, only actuators with pre-load can be used under tensile loads (these tensile forces must be less than the pre-load, given in the data sheet).
- Please note that the acceleration of the ceramic material (e.g., caused by fall down, discharging or high dynamic application) can cause damage to the actuator.
- Heating of the ceramic material will occur during dynamic operation and is caused by structure conditional loss processes. This may cause failure if the temperature exceeds specified values cited below.
- With increasing temperature, up to the Curie temperature (usual values approx. 140°C - 250°C), the piezoelectric effect disappears.
- Piezoelectric actuators such stacks or various tables work electrically as a capacitance. These elements are able to store electrical energy over a long period (up to some days) and the stored energy may be dangerous.
- If the actuator remains connected to the drive electronics, it is discharged within a second after shutdown and quickly reaches harmless voltage values.
- Piezo-actuators can generate voltages by warming or cooling only. The discharge potential should not be ignored due to the inner capacitance. This effect is insignificant at usual room temperature.
- Piezo-actuators from **piezosystem jena** are adjusted and glued. Any opening of the unit will cause misalignment or possible malfunction and the guarantee will be lost.
- Please contact **piezosystem jena** or your local representative, if there are any problems with your actuator or power supply.
- **Caution!** Shock forces may damage the built-in ceramic element. Please avoid such forces, and handle the units with care, otherwise the guarantee will be lost.